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Remarks:

Reconsideration of the above referenced application in view of the enclosed amendment and remarks is requested. Claim 1 has been amended to address the Examiner's confusion regarding the use of the terms "operating environment" vs. "operating system." Existing Claims 1 to 20 remain in the application.

ARGUMENT

Claims 1-3, 5-8 and 17-19 remain rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 5,835,760 to Harmer (hereinafter "Harmer") in view of *Extensible Firmware Interface Specification – Draft for Review*, (hereinafter "EFIS"). This rejection is respectfully traversed and Claims 1-3, 5-8 and 17-19 and their progeny are believed allowable based on the above amendments and the following discussion:

Claim 1 has been amended to more clearly recite that the first set of instructions form at least a portion of the operating system. This is supported by the specification, at least on page 17 et seq. The specification and Figure 3 describe that "firmware extensions 310 may include any machine instructions that define operations that enable a data processing system to access additional machine instructions and data on a media, such as the operating system data and machine instructions 320. [emphasis added] Further, a self-describing media is defined as a "firmware extension, and the instructions and/or data to which the firmware extension enables access, represent a self-describing media module." As will be further described below, the references cited by the Examiner, either alone or in combination, do not teach that a self-describing media having a portion of the operating system may be accessed using firmware extensions residing on the same media using an EFI architecture.

Claim 1 has also been amended to make clear that it is a boot medium which requires use of the firmware extensions read from the medium in order to access the instructions that form at least a portion of the operating system. As will be further described below, the references cited

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by the Examiner, either alone or in combination, do not teach that the medium is a self-describing boot medium.

Further, it should be noted that combining the EFIS reference is improper and will not result in Applicants' invention. The EFI specification does not describe using self describing media to load the operating system. There is no motivation to combine the cited references that teach BIOS or firmware extensions, in general, with the EFI specification to a result in a self-describing media using EFI firmware extensions to read data from the media that would be unreadable without the firmware extension. Even if the combination were proper, the cited references do not teach the self-describing media as defined by Applicants' specification, and the EFI specification does not teach that a firmware extension can be used as in Applicants' invention.

Harmer teaches a method for using expansion BIOS stored in a computer device rather than being stored in flash or ROM memory on the system board. Generally, Harmer teaches a method similar to option-ROM usage. In one embodiment, Harmer teaches reading expansion BIOS from a peripheral which is associated with the device to be loaded into the host computer in order to properly initialize and operate the device (Col. 9, lines 23-29). Harmer describes a memory mapping scheme in order to read the expansion BIOS from the device storage. This and other embodiments of Harmer teach that the BIOS contains enough code to read the initialization instructions for the device and then may initialize the device. In each case, Harmer teaches a simple memory mapping scheme to retrieve the device initialization information from the peripheral or device. The ability to read the information on the device is contained with the platform BIOS, of Harmer. At no time does Harmer teach, suggest or imply that the device can be a boot device.

In contrast, the claimed invention is directed toward a system and method that enables a firmware extension to be read from a self-describing boot media device enabling the firmware to read previously inaccessible portions of the boot media. For instance, DVD formats are defined such that EFI firmware is typically incapable of reading all portions of the DVD, because the drivers are too complex to be loaded into the platform firmware. Thus, in systems existing at the time of Applicants' invention, DVDs could not be boot media, as not all of the data on the DVD was accessible to the firmware. In some claimed embodiments of Applicants' invention, the boot

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media contains portions of the operating system or operating systems loader. Without the firmware extension read from the boot media, the system would not have been able to boot from this media.

It should be noted that Claim 1 requires *a loader for an operating system environment, and boot and runtime service calls available to the operating system environment*. Claim 1 also requires *the machine-readable boot medium to be used in initializing the operating system environment for the system upon power up, the machine-readable boot medium comprising a first set of instructions forming at least a portion of the operating environment*. An operating environment, or operating state, is described in the Specification Background section as follows:

“The process of bringing a data processing system to its operating state from a powered down state is commonly known as bootstrapping, booting up, or the boot process. Bootstrapping typically begins with one or more processors in a data processing system. Each processor tests its internal components and interfaces. After the initial processor testing, initialization of system level resources commences. In multiprocessor systems, a single bootstrap processor (BSP) may be selected to handle initializing remaining processors and to handle the system level initialization. System level initialization typically includes procedures for checking memory integrity, identifying and initializing other resources in the data processing system, and loading an operating system (OS) into memory.” [emphasis added]

The firmware extensions taught by Harmer teach only that portions of BIOS are able to be stored on a mass medium. BIOS portions are well understood by those skilled in the art to be part of the *firmware* of a system and not part of the *operating system*. Applicants' claimed invention requires that at least a portion of the operating system environment, i.e., an operating system reside on the mass medium. Applicants' claimed invention also requires that the medium contains instructions enabling the operating system portion to be accessed by the firmware.

Harmer does not teach or suggest that the expansion firmware read from a peripheral enables previously unreadable instructions to be accessed from the storage. Harmer teaches that the expansion firmware enables initialization of the device, but not that the expansion firmware describes how to access other portions of media within the peripheral devices. As discussed above in terms of a DVD, some types of media require complex drivers that are not available in the delivered platform firmware, and thus in legacy systems, could not be *boot* media. A self-describing media module (Para. 49 of the specification) may be used to modularly extend

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platform firmware capabilities and to minimize non-volatile memory in a data processing system. "For example, a motherboard in a computer may have flash memory storing platform firmware that implements a basic input/output system, which cannot read an entire media containing an OS because the OS uses an unknown format. But the basic input/output system can read a portion of the media, and this portion enables reading of the remainder of the media." In this way, the media is "self-describing." At no time does Harmer teach this type of media.

The Examiner admits that Harmer does not teach or suggest the details of utilizing an EFI Architecture to enable Applicants' invention. However, the Examiner cites the EFIS as showing *an extensible firmware interface (EFI) comprising data tables having platform-related information, a loader for an operating environment, and boot and runtime service calls available to the operating environment, wherein the EFI enables extension of platform firmware by loading driver and application images, which when loaded, have access to all EFI defined runtime and boot service.* The EFI specification describes how to write a driver to reside in the flash portion, but does not describe the ability to retrieve an EFI image from self-describing media modules. The Examiner asserts that the EFIS teaches a loader for an operating system environment at pages 9, 104 and § 4.4. However, the EFIS teaches away from Applicants' invention on page 104. The EFIS (II, 3-7) describe:

"The platform firmware is able to retrieve the OS loader image from the EFI System Partition. The specification provides for a variety of mass storage device types including disk, CD-ROM and DVD as well as remote boot via a network. Through the extensible protocol interfaces, it is possible to envision other boot media types being added, although these may require OS loader modification if they require use of protocols other than those defined in this document." [emphasis added]

It will be apparent to one of ordinary skill in the art that only some types of media may be used as the *boot media* in existing systems. The authors of the EFIS envisioned that the OS loader would require modification in order to use additional types of boot media. In contrast, Applicants' claimed invention allows the EFI OS loader to remain generic and unmodified and still boot from various non-standard media. This is enabled because the claimed invention requires that the boot media be self-describing via a firmware extension of a self-describing media module. The firmware extension enables the EFI firmware to be able to read a second portion on the media which contains at least a portion of the operating environment, i.e.,

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operating system. Neither Harmer nor the EFIS, separately or combined, teach or disclose a self-describing media that enables the system to boot from a non-standard medium.

Moreover, Harmer teaches that the expansion BIOS retrieved from a device is related to the device. At Col. 12, lines 63 et seq., Harmer teaches that the BIOS finds and configures a mass memory storage device and then loads the expansion BIOS from the mass storage device. It is inherent in these teachings that the system BIOS contains enough information to read the mass storage device. In contrast, Applicants' claimed invention recites that the information needed to read the required data from the media device is read from the media device (self-describing).

The Examiner cites Col. 9, lines 16-29 et seq. as prior art for a self-describing medium. In fact, Harmer merely teaches a memory mapping scheme to enable information to be read in order to "properly initialize the device." In contrast, Applicants' claims recite a system wherein the one or more firmware extensions residing on the boot media comprise a self-describing media module, thus enabling the firmware to read other portions of the media. This firmware extension is not limited to initializing the device. The Examiner asserts that there is motivation for incorporating the extensible firmware interface into Harmer. However, even if the teaching of the EFIS is combined with Harmer, it would merely result in a method for storing firmware extensions on mass media in an EFI architecture platform. This combination would not result in self-describing boot media enabling the EFI platform to boot from a medium type that was not previously customized in the EFI OS loader module. Thus, since all of the claimed features are not shown by the cited references, either alone or in combination, the Examiner has failed to show a *prima facie* case of obviousness. Therefore, Claims 1-6 are believed allowable.

Similarly, Claim 7 is directed toward the self-describing medium that enables the EFI to use the medium as boot media. Claim 7 requires *a first set of instructions in a first portion of the medium defining operations for enabling a machine to access a second set of instructions in a second portion of the medium comprising at least a portion of an operating system stored on the machine-readable medium in a format that is unreadable by the machine before the machine loads the first set of instructions*, wherein the first set of instructions comprises at least one extensible firmware interface (EFI) image providing a software abstraction enabling access to the second portion of the medium, wherein platform firmware of the machine does not have a

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mechanism to access the second portion of the medium prior to accessing the EFI image. As discussed above, neither Harmer nor the EFIS teach or disclose all of the claimed elements of Applicants' invention. Thus, Claims 7-12 are believed allowable.

Claim 17 requires a self-describing mass storage means providing means for extending platform firmware capabilities during system booting before an operating system loader is loaded and run, wherein means for extending platform firmware capabilities comprises an extensible firmware interface (EFI) image residing on the self-describing mass storage means, the image providing a software abstraction enabling access to a second portion of the medium comprising at least a portion of the operating system loader, wherein platform firmware of the machine does not have a means to access the second portion of the medium prior to accessing the EFI image. Neither Harmer nor the EFIS either separately or in combination teach a mass storage means having an EFI image that enables access to a previously inaccessible operating system loader portion. Therefore, Claim 17-20 are believed allowable.

Claims 4 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Harmer and *EFI Specification – Draft for Review* further in view of *BIOS Updates*. This rejection is respectfully traversed and Claims 4 and 20 are believed allowable based on the foregoing and following discussion.

BIOS Updates, at least, fails to teach or disclose that the system has an extensible firmware interface. None of the cited references, either alone or in combination, teach or describe retrieving information or extensions from non-volatile memory comprising RAM which is a self-describing media device. Applicants' claimed invention generally requires an EFI system which is configured to retrieve EFI images for firmware extension from self-describing media. Thus, Claims 4 and 20 are believed allowable.

Claims 9-11 and 13-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Harmer and *EFI Specification – Draft for Review* in further view of U.S. Pat. No. 5,978,912 to Rakavy et al. (hereinafter "Rakavy et al."). This rejection is respectfully traversed and Claims 9-11 and 13-16 are believed allowable as amended based on the foregoing and following discussion.

The Examiner admits that Harmer does not teach or disclose that the medium may contain a portion of the operating system or operating system loader. The Examiner asserts that

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Rakavy et al. teach this element. Rakavy et al. teach a method and system for communicating with a computer through a network prior to booting the computer's operating system. Rakavy et al. teach a method to retrieve BIOS enhancements over a network. At no time do Rakavy et al. teach or disclose a system with an EFI architecture where the EFI enables extension of platform firmware where one or more loaded firmware extensions retrieved from the boot media enable the system to access the operating system loader from a portion of the boot media that was inaccessible to the unextended platform firmware. Instead Rakavy et al. teach that a bootstrap loader may be retrieved during POST from a predetermined location on the boot device. (Col. 2, lines 27-28). This teaches away from Applicants' claimed invention requiring a *self-describing machine-readable medium*. Applicants' claimed invention requires that the operating system or OS loader reside on a portion of the medium that is inaccessible to the firmware until such time as a firmware extension is retrieved from the medium, where the firmware extension enables the firmware to access the OS or loader portion from the medium (boot device). Rakavy et al. discuss that optional hardware devices may be initialized using option-ROM (aka firmware extension). Rakavy et al. does not teach or suggest that these optional hardware devices are self-describing, or that they also contain a portion of the operating system. Further, Rakavy et al. do not teach or suggest that the optional hardware devices can be the boot device. Thus, a combination of the teachings of Harmer, the EFIS and Rakavy et al. will not result in Applicants' claimed invention. Thus, Claims 9-11 and 13-16 are believed allowable.

Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Harmer, *EFI Specification – Draft for Review*, Rakavy et al. and further in view of *Unicode Technical Report #10*. This rejection is respectfully traversed and Claim 12 is believed allowable as amended based on the foregoing and following discussion.

None of the cited references, either alone or in combination, teach or disclose a self-describing machine readable medium having a first portion with instructions (firmware extension) for enabling a system having an EFI architecture to access a second, previously inaccessible or unreadable, portion, where the extension to platform firmware capability comprises a Unicode collation module. Thus, Claim 12 is allowable. All claims remaining in the application are now allowable.

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To summarize, Applicants' claimed invention enables a system to boot from a boot device that was previously unavailable to be used as a boot device. The Examiner asserts that combining the teaching of the EFIS, with the legacy practice of storing device initialization information on an optional device ROM (option-ROM or firmware extension) would result in Applicants' invention. The Examiner fails to note that legacy systems could not use these optional devices as the boot device unless the protocols to read the data on the boot device were programmed in the platform firmware. While the EFIS teaches a new architecture and a new method for loading EFI images (e.g., firmware extensions), it does not teach or suggest that the firmware extension can reside on a self-describing boot device that has an unknown protocol for accessing the operating system or OS loader portion. Applicants' invention would not be obvious to one of ordinary skill in the art even when combining the cited references, because none of the references teach this self-describing medium for either legacy systems or EFI architecture systems.

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CONCLUSION

In view of the foregoing, Claims 1 to 20 are all in condition for allowance. If the Examiner has any questions, the Examiner is invited to contact the undersigned at (703) 633-6845. Early issuance of Notice of Allowance is respectfully requested. Please charge any shortage of fees in connection with the filing of this paper, including extension of time fees, to Deposit Account 02-2666 and please credit any excess fees to such account.

Respectfully submitted,

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